Training Manual cum Report

Capacity Building Training on

Processing of Aonla Fruits for Value Addition

January 28-30, 2020



Organised by

College of Horticulture and Forestry
A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya-224 229
Under

ICAR-NAHEP-Innovation Grant Project

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January 28-30, 2020

Organised by
Prof. O.P. Rao. Organising Secretary Training
Prof. Bhagwan Deen, Co-organising Secretary Training



Compiled & edited by
Prof. Bhagwan Deen
Ph.D. Horticulture, JRF, NET, Ex. ARS, PCS (A)
Prof. & Head
Department of Post-Harvest Technology

Department of Post-Harvest Technology
College of Horticulture & Forestry
A.N. D. University of Agriculture & Technology
Kumarganj, Ayodhya, U.P. India-224229

A.N.D. University of Agriculture & Technology



Dr. Bijendra Singh
Vice Chancellor

Kumarganj, Ayodhya,
U.P.-224229, India

Foreword

The aonla tree thrives well even on the land which is not fit for the growing of other fruit crops. The aonla needs comparatively lesser care in growing. The aonla fruit is rich in nutrients, antioxidant properties and medicinal values, however fruit is not popular as table fruit because of its astringent taste. The processing techniques have been developed to process the aonla fruits into palatable quality products. The processing and value addition technology on aonla fruit can be disseminated through hands on training which improves the skill and confidence in the participants. In addition, processing increases the demand of the fruits subsequently farmers get better return of their produce and consumers get opportunity to purchase nutrients rich products year-round.

The 'Capacity Building Training on Processing of Aonla Fruits for Value Addition' conducted under ICAR-NAHEP Innovation Grant Project at College of Horticulture & Forestry for the girl students of the College of Agriculture and College of Home Science will be quite useful to the students. The resource materials, included in this report are in simple language and prepared to cater the students need, will develop better understanding to the readers. I appreciate Prof. O.P. Rao and Prof. Bhagwan Deen for their concerted efforts in conducting the training.

February ,2020 (Bijendra Singh)

Acknowledgment

We wish to thank all the people and organisations without whose assistant we could not have completed this training successfully. We feel immense fervent in expressing our deep sense of gratitude to Dr. Bijendra Singh, Vice Chancellor, A.N.D. University of Agriculture and Technology for providing necessary approval and permission to organise this wonderful capacity building training. We are highly grateful to Professor H.N. Singh, Dean College of Veterinary Sciences and Principal Invigilator of ICAR-NAHEP Innovation Grand Project who guided, motivated and encouraged us to complete the task. The authors are highly thankful to Professor V.N. Rai, Dean College of Agriculture; Professor D.K. Dwivedi, Dean College of Home Sciences, Professor I.S. Singh ex Prof. & Head, Department of Post-Harvest Technology and other resource persons who have provided their guidance, expertise and knowledge for building the capacity in the participant students on value addition to Aonla fruits. We are also thankful to research scholars Mr. Harendra, Mr. Ajendra, Mr. Amit Kumar Verma and PG student Ms. Vartika Singh, who actively involved in organising the training. Our thanks extend to Mr. Harish Chandra Singh, Department of Post-Harvest Technology for necessary support during preparation of aonla products in the processing laboratory. At the finally, we express our sincere thanks to ICAR-NAHEP for providing grants to this remarkable work.

Prof. O.P. Rao
Prof. Bhagwan Deen

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Introduction

Aonla (*Emblica officinalis*) fruits are good source of vitamin C, minerals and antioxidants. The fruit is not popular as table fruit because of its astringent test but it can be processed into quality products to make it available during off season. The regular use of aonla fruit and its process products, improves the health and longevity of the people. The fruits are available from October to February at cheaper rate that can be processed into quality products to add value in the fruits. The training on aonla processing will improve the knowledge and skills of the participants which can enhance the preservation and thereby value addition to aonla fruits.

The curriculum of the training on processing of Aonla fruits for value addition was developed by the department of Post-Harvest Technology of Horticultural Crops, College of Horticulture and Forestry to equip the students with knowledge, skills, hands on training and professional qualities appropriate to add value to aonla fruits through processing techniques.

Objectives of Training

The training is conducted to fulfil the following objectives-

- To develop knowledge, skills, attitude and professional qualities in the students required for value addition to aonla fruits.
- To give hands on training on aonla processing and value addition.
- To build capacity and confidence in participant students on value addition of aonla fruits.

Selection of students and training method

The girl students are nominated from college of Agriculture and College of Home Science by the Dean of the concerned college. The nominated students were registered for the training. Dr. Bijendra Singh, Vice Chancellor, A.N.D. University of Agriculture and Technology and DG, UPCAR inaugurated the training. Prof. O.P. Rao, Dean College of Horticulture and Forestry and organising secretary of the training welcome the participants and introduced the students about training in details. The training began just after the pre valuation of the knowledge and skill of the students on aonla processing and value addition. The lecture, discussion, interaction, practical, organoleptic evaluation of the prepared products and post training evaluation techniques were included during the training. The PowerPoint presentation, interactive boards, machinery and equipment of the processing laboratory were used to train the participants. Finally, plenary session was organised to distribute the certificates to the participants who have successfully completed the training.

Training curriculum

The topics covered under training are –

- Processing of aonla fruits for value addition
- Hygiene, sanitation and safety in food processing units
- Entrepreneurship development through value addition and processing of aonla
- Preservatives for fruits and vegetables processing

- Aonla products- Sauce, Chutney and pickle
- Significance of aonla in processing industry
- Preparation technology of aonla based blend beverages and
- Food Processing Policy of Government of Uttar Pradesh

The hands-on skill was developed, and following products were prepared by the trainees. The prepared products were distributed among trainees for organoleptic evaluation-

- Aonla Preserve
- Aonla Candy
- Aonla RTS
- Aonla Syrup
- Aonla Squash
- Aonla Supari
- Aonla Pickle and
- Aonla Shreds

The day to day programme was as under

Day to day Programme

Date	Time	Topics	Resource Person/Guest speakers
28.01.20	10.00AM-10.30AM	Registration	Dr. Ulman Yashmita Nitin /PG Students
	10.30AM-10.40AM	Pre- evaluation test for participants	Prof. Bhagwan Deen/ Co-Organising Secretary
	10.40AM-11.30AM	Inauguration and inaugural address	Prof. Bijendra Singh Hon'ble Vice Chancellor
	11.30 AM-11.55AM	Welcome Address	Prof. O.P. Rao, Dean, CH&F/ Organising Secretary
	12.00 AM-1.00 PM	Vote of Thanks	Prof. Bhagwan Deen, Prof. & Head, PHT/ Co-Organising Secretary
	1.00 PM-2.00 PM	Processing of aonla fruits for value addition	Prof. I.S. Singh, Ex. Prof. & Head, Post-Harvest Technology, A.N.D.U.A.T., Kumarganj, Ayodhya.
	2.30 PM-3.30 PM	Hygiene, Sanitation and safety in Food Processing Units	Dr. Archana Singh, SMS, KVK, Mankapur Gonda-II
	3.30 PM-5.30 PM	Practical- Aonla Preserve & Aonla Candy	Prof. Bhagwan Deen
29.01.20	10.00 AM-11.00AM	Entrepreneurship Development through Processing and Value Addition of Aonla	Dr. Pawan Singh Gujar, Scientist, PHM Division- ICAR-CISH, Lucknow
	11.00 AM-12.00PM	Preservatives for Fruits and Vegetables Processing	Prof. Bhagwan Deen, Prof. & Head, Post-Harvest Technology
	12.00PM-1.00PM	Practical- Aonla Supari,	Prof. Bhagwan Deen
	1.00-2.00PM	Practical- Aonla Pickle	Prof. Bhagwan Deen
	2.30PM-3.30PM	Practical- Aonla RTS	Prof. Bhagwan Deen
	3.30PM-5.00PM	Practical- Aonla Shreds	Prof. Bhagwan Deen

30.01.20	10.00 AM-11.00AM	Preparation of Aonla beverages	Prof. Sanjay Pathak, Prof.&. Head, Department of Fruit Science
	11.00 AM-12.00PM	Food Processing Policy of Government of Uttar Pradesh	Mr. R. P. Gautam, Principal, Govt. Food Science Training Centre, Ayodhya
	12.00PM-1.00PM	Significance of Aonla in Processing Industry	Prof. D. Ram
	1.00-2.00PM	Practical- Aonla Squash	Prof. Bhagwan Deen
	2.30PM-3.30PM	Practical- Aonla Syrup	Prof. Bhagwan Deen
	3.30 PM-5.00PM	Plenary Session	Prof. Bijendra Singh Vice Chancellor/ Prof. H.N. Singh/Prof. O.P. Rao

(Bhagwan Deen)
Co-Organising Secretary

List of Resource Persons

The following resource persons actively participated in the training. The all resource persons including from ICAR and Government of Uttar Pradesh are enlisted below-

1. Prof. I. S. Singh, Ex- Prof & Head, Department of Post-Harvest Technology, A.N.D. University of Agriculture and Technology, Ayodhya.
2. Dr. Pawan Singh Gurjar, Scientist, PHT Division, ICAR-CIAH Lucknow.
3. Dr. Archana Singh, SMS KVK Mankapur Gonda-II
4. Prof. Bhagwan Deen, Prof. and Head, Department of Post-Harvest Technology, A.N.D. University of Agriculture and Technology, Ayodhya.
5. Dr. Vinod Singh, SMS, KVK, Varanasi.
6. Prof. Sanjay Pathak, Prof. & Head, Department of Fruit Technology, A.N.D. University of Agriculture and Technology, Ayodhya.
7. Prof. D. Ram, Prof. & Head, Department of MAP, A.N.D. University of Agriculture and Technology, Ayodhya.
8. Mr. R. P. Gautam, Principal, Government, Food Science Training Centre, Faizabad, Ayodhya.

List of Participant students

The girl students from the College of Agriculture and College of Home Science who participated in the capacity building programme are enlisted below with their Id. numbers-

S.No.	Name	Id. No.	College
1.	Jyotsna Maurya	A-10164/18	Agriculture
2.	Samridhi Maurya	A-10276/18	Agriculture
3.	Ritika	A-9267/16	Agriculture
4.	Namanpreet Kaur	A-9699/17	Agriculture
5.	Kanchan Singh	A-9694/17	Agriculture
6.	Neetu Singh	A-10173/18	Agriculture
7.	Aashi Singh	A-10114/18	Agriculture
8.	Kalpana Yadav	A-9141/16	Agriculture
9.	Deeksha Shukla	A-9763/17	Agriculture
10.	Sunaina Kumari	A-9722/17	Agriculture
11.	Aarushi Verma	H-9348/16	Home science
12.	Anjali	H-9349/16	Home science
13.	Diksha Kushwaha	A-10897/19	Agriculture
14.	Anshu Priya	H-9351/16	Home science
15.	Priya Shukla	A-10918/19	Agriculture
16.	Aparna Singh	H-9353/16	Home science
17.	Ayushi	H-9354/16	Home science
18.	Diksha Srivastava	H-9356/16	Home science
19.	Deeksha Tiwari	H-9457/16	Home science
20.	Fatima Ansari	H-9358/16	Home science
21.	Jyoti Mourya	H-9360/16	Home science
22.	Km. Ankita Yadav	H-9361/16	Home science
23.	Km. Gurhiya	H-9362/16	Home science
24.	Manisha	H-9365/16	Home science
25.	Manju	H-9366/16	Home science
26.	Parul Maurya	H-9368/16	Home science
27.	Samiksha Devi	H-9376/16	Home science
28.	Shipra Tripathi	H-9377/16	Home science
29.	Anuradha Singh	A-10565/18	Agriculture
30.	Sapana Maurya	A-11178/19	Agriculture

Materials Distributed to Trainees

The following materials were distributed to the students who got registered in the capacity building training. The products prepared during practical exercise were given to trainees after organoleptic evaluation. The few samples of the prepared products were kept for demonstration purpose-

- Stationary- Pens and Pads
- Soft copy of Power Point Presentations
- Soft copy of report and resource materials including Lecture Notes.
- Processed products prepared for value addition in aonla fruits during hands on training.

Trainees Pre v/s Post Evaluation Results

S.No.	Name	Id. No.	Pre evaluation marks	Post evaluation marks	College
1.	Jyotsna Maurya	A-10164/18	7.0	9.5	Agriculture
2.	Samridhi Maurya	A-10276/18	6.5	10.0	Agriculture
3.	Ritika	A-9267/16	7.5	9.0	Agriculture
4.	Namanpreet Kaur	A-9699/17	7.0	9.0	Agriculture
5.	Kanchan Singh	A-9694/17	7.0	9.0	Agriculture
6.	Neetu Singh	A-10173/18	5.5	9.0	Agriculture
7.	Aashi Singh	A-10114/18	5.0	10.0	Agriculture
8.	Kalpana Yadav	A-9141/16	6.0	10.0	Agriculture
9.	Deeksha Shukla	A-9763/17	6.5	10.0	Agriculture
10.	Sunaina Kumari	A-9722/17	7.0	10.0	Agriculture
11.	Aarushi Verma	H-9348/16	6.5	9.0	Home science
12.	Anjali	H-9349/16	6.0	9.0	Home science
13.	Diksha Kushwaha	A-10897/19	5.5	9.5	Agriculture
14.	Anshu Priya	H-9351/16	6.5	9.5	Home science
15.	Priya Shukla	A-10918/19	5.0	8.5	Agriculture
16.	Aparna Singh	H-9353/16	8.0	9.0	Home science
17.	Ayushi	H-9354/16	6.5	10.0	Home science
18.	Diksha Srivastava	H-9356/16	7.5	9.5	Home science
19.	Deeksha Tiwari	H-9357/16	6.0	8.5	Home science
20.	Fatima Ansari	H-9358/16	6.5	9.5	Home science
21.	Jyoti Mourya	H-9360/16	7.0	9.5	Home science
22.	Km. Ankita Yadav	H-9361/16	7.5	10.0	Home science
23.	Km. Gurhiya	H-9362/16	7.0	9.0	Home science
24.	Manisha	H-9365/16	5.5	9.5	Home science
25.	Manju	H-9366/16	5.5	10.0	Home science
26.	Parul Maurya	H-9368/16	6.0	9.0	Home science
27.	Samiksha Devi	H-9376/16	7.5	9.0	Home science
28.	Shipra Tripathi	H-9377/16	8.0	9.5	Home science
29.	Anuradha Singh	A-10565/18	6.0	9.5	Agriculture
30.	Sapana Maurya	A-11178/19	7.5	9.5	Agriculture

Images from Training
















Resource Materials

Processing of Aonla fruits for value addition

I.S. Singh[1] and Bhagwan Deen[2]

1- Ex. Prof.& Head, Department of Post-Harvest Technology,
2- Prof. & Head, Department of Post-Harvest Technology,
A.N.D. University of Agriculture &Technology, Kumarganj, Ayodhya, U.P., India
Email: drbdpasi@gmail.com

Aonla is a sour and astringent fruit, hence, not popular as Table fruit. It has great potentiality for processing into number of foods, medicinal and cosmetic products.

Food products

Fruits can be processed into number of food products such as preserve, candy, toffee, jam, herbal jam, jelly, fruit bar, sweets, sauce, pickles, chutney, and beverages such as pulp, juice, ready to serve (RTS), squash, herbal syrup, tea etc. The techniques for preparation of these products are as under.

Preserve

Recipe:

Fruits 1 kg and sugar 1 to 1.25kg

Technique:

Mature fruits→ Washing→ Pricking→ Dipping in alum solution (2%) for 24 hours→ Washing→ Blanching (in boiling water) for 5 minutes→ Steeping in 40% sugar syrup for 24 hours→ Steeping in 50% sugar syrup for 24 hours→ Steeping in 60% sugar syrup for 24 hours→ Steeping in 70% sugar syrup for 3-4 days→ Preserve→ Packing in glass jar/plastic jar (food grade) →Storage.

Osmotic dehydrated segments

Aonla fruits→ Washing→ Pressure cooking for 10 minutes→ Cooling→ Separation of segments and removal of stone→ Dipping in 70% TSS Syrup for 24 hours→ Raising TSS twice to 70% after every 24 hours→ Draining→ Dehydration for 3 hours→ Storage.

Candy

Recipe:

Aonla fruit 1kg and Sugar 1.25kg.

Technique:

Mature fruits→ Washing→ Pricking→ Dipping in alum solution (2%) for 24 hours→ Washing→ Blanching (in boiling water) for 5 minutes→ Steeping in 40% sugar syrup for 24 hours→ Steeping in 50% sugar syrup for 24 hours→ Steeping in 60% sugar syrup for 24 hours→ Steeping in 70% sugar syrup for 3-4 days→ Preserve→ Draining quickly from sugar syrup→ Hot water rinsing for 2 second→ Drying up to 15-20% moisture→ Candy→ Packing in glass jar/ plastic jar or polyethylene bag→ Storage/ Marketing.

Toffee

Recipe:

Aonla pulp 1kg, Sugar 750g, Glucose 100g, Skim milk powder 150g and Butter 50g.

Technique:

Pulp→ Heating→ Concentrating up to one-third volume→ Mixing with sugar glucose, butter and milk powder→ Cooking up to compact solid mass→ Removing from fire→ Adding colour and essence→ Mixing→ Spreading mass uniformly (0.5-0.75 cm thickness) on a table with stainless steel top/ tray smeared with butter→ Allow to cool and set 2-4 hours→ Cutting into cubes→ Wrapping in butter paper→ Storage.

Jam

Recipe:

Pulp 1 kg, Sugar 0.75 kg, Citric acid 1.5g, Water 150 ml

Technique:

Aonla fruits→ Heating in boiling water (10 minutes)→ Separation of segments and removal of stone→ Addition of water in ratio of 1:0.75→ Passing through pulping machine→ Pulp→ Mixing with sugar→ Cooking up to desired consistency→ Addition of citric acid→ Judging of end point (TSS 68%)→ Filling into clean sterilized bottles→ Capping/Sealing→ Storage.

Herbal Jam

Recipe:

Aonla pulp 1 kg, Sugar 0.75 kg, Citric acid 2 g, Asparagus juice 200 ml, Nagauri Ashaw gandh powder 50 g.

Technique:

Pulp→ Mixing with Asparagus juice and Ashaw gandh powder→ Addition of sugar→ Cooking→ Addition of citric acid→ Judging of end point→ Filling into sterilized bottle→ Capping→ Storing.

Jelly

Recipe:

Strained juice 1 liter, Sugar 0.75 kg, citric acid 1.5g

Technique:

Aonla fruit (mature) → Washing→ Cutting into pieces/slices→ Removal of stone→ Boiling with water (one and half times the weight of fruit for 20 to 30 minutes) → Boiling→ Addition of citric acid→ Straining of extract→ Pectin test for addition of sugar (alcohol test or jell meter test) → Addition of sugar→ Cooking→ Judging of end point (temperature test – 105^0C or TSS – 65% or sheet or drop test) → Removal of scum/foam→ Filling hot in clean and sterilized bottles→ Capping→ Storage.

Fruit Bar

Recipe:

Aonla pulp 1kg, sugar 150g, citric acid 1g and KMS 1g.

Technique:

Aonla fruit→ Washing→ Heating in boiling water for 10 minutes→ Separation of segments→ Removal of stone→ Addition of water (in ratio of 1:1) → Passing through pulping machine→ Pulp→ Mixing with sugar, citric acid and KMS→ Spreading on tray→ Drying in cross – flow drier at 60^0C (until can be taken out in the form of sheet) → Cutting of sheet into small bar→ Wrapping in cellophane paper→ Packing in polythene pouches→ Storage.

Sweets

Recipe:

Aonla shred 1kg, sugar 1kg, water 0.5 liter and melon seed 100g.

Technique:

Aonla fruit→ Washing→ Grating into shred→ Little drying / Squeezing→

Adding in sugar syrup (Sugar + water boiling and straining) → Cooking up to desired consistency→ Addition of melon seed→ Making in shape of laddu and burfi→ Little drying in shade→ Packing in attractive cardboard box (sweet dibba) → Use / Sale / Storing (up to 1 month).

Sauce

Recipe:

Pulp 1kg, sugar 75g, salt 10g, onion 50g, garlic 5g, ginger 10g, red chilies powder 5g, hot spices 10g, acetic acid 2 ml and sodium benzoate 0.25g.

Technique:

Aonla fruits→ Washing→ Heating in boiling water for 10 minutes→ Separation of segments and removal of stone→ Addition of water in ratio of 1:1→ Passing through pulper→ Straining→ Pulp→ Mixing with one third sugar (25 g) → Cooking→ Adding extracts of onion, garlic, ginger, chilies and hot spices while cooking→ Adding acetic acid and remaining sugar→ Testing of end point for desired consistency→ Addition of salt→ Addition of sodium benzoate (by dissolving in water) → Bottling→ Crown corking→ Processing in boiling water for about 20 minutes→ Cooling→ Storing.

Pickle

Recipe:

Aonla 1kg, Salt 150g, Nigella seed 10g, Red chili powder 10g, Fenugreek 30g, Turmeric powder 10g, Cumin powder 50g, Oil 350ml.

Technique:

Aonla→ Washing→ Blanching till it become soft→ Separation of segment and seed removal→ Frying spices in oil→ Mixing with segments→ Frying for 5 minutes→ Mixing salt→ Filling into jar→ Keeping in sun for a week→ Storing.

Chutney

Recipe:

Aonla fruit 1.25kg, Sugar 1kg, Salt 50g, Ginger 15g, Hot Spices 25g, Red chilies 10g, and glacial acetic acid 10ml.

Technique:

Mature fruits→ Washing→ Steam for 15 minutes in pressure cooking→ Passing through pulper→ Fine pulp→ Mixing with all ingredients except acetic acid→ Cooking the mixture to a desired consistency→ Adding glacial acetic acid→ Filling into glass bottles→ Capping/Sealing→ Cooling→ Storing.

RTS (Ready To Beverage)

Recipe:

Aonla pulp 10%, Ginger juice 2%, Total soluble solids 11%, Acidity 0.25%, SO_2 70 ppm.

Technique:

Pulp + Ginger juice→ Mixing with syrup solution (Sugar + water + citric acid, heating and straining) → Addition of preservative→ Bottling→ Crown corking→ Pasteurization→ Air cooling→ Storing.

Squash

Recipe:

Pulp 25%, Total soluble solids 50%, Acidity 1%, SO_2 350 ppm.

Technique:

Pulp→ Mixing with syrup solution→ Addition of preservative→ Mixing→
Bottling→ Capping→ Labeling→ Storing.

Supari (Chewing product)

Supari prepared is light in color, soft in texture having good amount of vitamin C. It can be a very good alternative of *pan mashala*, which have adverse effect on human health. The technique for preparation is as under:

Technique:

Aonla fruit → Blanching → Separation of segments → Cutting the segments into four pieces → Mixing with common salt (2.5%) → Keep overnight → Removal of leaches if any → drying of pieces in dehydrator at 60^0C (up to 5-6% moisture) → Packing in polythene pouches → Storing at room temperature.

Herbal tea powder

Herbal tea stimulates appetite and strengthen digestive system, nervine tonic and improves sense organs.

Recipe:

Dried aonla 1kg, dried *bahera* 100g, *pipal*i 50g, *sonth* 100g, cinnamon powder 50g, clove powder 5g, *tulsi* powder 5g, and cardamom 10g.

Technique:

All ingredients→ Mixing thoroughly → Grinding in to powder → Packing in polythene pouches→ Sealing → Storage. Tea can be prepared by boiling 3 cup water + 1 teaspoon full tea powder and filtered. No milk is used. Sugar may or may not be added.

Carbonated beverages

Recipe:
10% juice, 11% total soluble solids, 0.2% acidity under 10 psi of carbon dioxide pressure was found to be the ideal.

Technique:

Aonla/juice /Concentrate→ Mixing with Strained, cooled sugar syrup→ Measuring of TSS→ Deaeration→ Cooling→ Mixing Syrup with Water→ carbonation(jetting)→ Transferring to storage tank→ Cooling(3-4°C) →Bottling/Bottling & sealing→ Marketing.

Cider

Aonla cider is refreshing health drink, which contains 10% total soluble solids and 4% alcohol with some polyphenols (0.4%) and ascorbic acid.

Technique:

Aonla juice (ameliorated) → fermented with yeast (*Saccharomyces cerevisiae*) → Siphoning of clear fermented juice→ Maturation→ Bottling→ Storage/Marketing (up to one year).

Products having medicinal properties

Medicinal products of aonla used for treating chronic dysentery, hemorrhage, diabetes, bronchitis, fever, diarrhea, dyspepsia, cough, scurvy, jaundice, anemia, piles dermatitis disease, associated with blood and preventing aging. Fruits are used in various *Aurvedic* preparations such as *Chavanprash, Triphla, Triphla churn, Amalki churn, Amalki grith, Amalki rasayan, Amalki awaleh, Dhatri lauh,* Diabetes powder*, Mahatikt grith, Bavasir nasak, Mahausidhi* and *Amrit kalash.* The technique for preparation of some of the products are given below:

Chavanprash

Recipe:

Bael root, Arari bark of Sonapan, Gambhar root bark, Pathal root bark, Bari and chhoti kateri root, Gokharu, Shal purnomul, Pushti parni, Balamul, Kankarsingi, Pushkarmul, Vasamul, Mashparni, Jiwanti, Punarwa, Guruch, Pipali, Haritki, Draksha, Small Cardamom, Kaknasa, Agarkasht, White Sandal, Nagarmotha, Kachur, Bikshari kand, Neel kamal, Ridhi, Bridhi jiwak, Rishmak Menda, mahamenda, kakoli, kshir kakoli – 50 g each.Water 13 liter, fresh aonla 6kg, Banslochan 200g, Pipali (big) 200g, Cinnamon 100g, Cardamom (small) 50g, Cassia 50g, Nag kesar 50 g, Ghee (Cow) 300g, Honey 300g and sugar 6kg.

Technique:

Decoction ingredient→ Cut the ingredients into small pieces. Put the pieces into aluminum / steel *bhagauna*→ Add water and cook it up to ¼ mass→ Strained with the help of muslin cloth→ Boil fresh aonla till it becomes soft and remove stone→ Prepare the pulp of segments→ Put fat (ghee) into steel *bhagauna* and little heating→ Add aonla pulp and fry till pulp becomes brown / reddish and releases ghee→ Take out from fire→ Add sugar in strained decoction and cooking→ When the syrup become concentrated (2 tar), add fried pulp of aonla and mix it thoroughly→ Take out from fire and cool it→ Add banslochan, Nagkesar, Pipali, Cinnamon, Cardamom, Cassia, by making fine powder→ Add honey in the last after cooling the product→ Packing the *chavanprash* in suitable container→ Storing.

Amalki churn

This is useful in acidity, blood, aging etc. The technique for preparation of Amalki churn is as under:

Technique:

Aonla fruits→ Drying→ Breaking→ Removal of seed→ Grinding into fine powder→ Packing in small glass bottle/Plastic bottles (food grade) → Storing.

Aonla churan

Recipe:

Aonla powder 100g, Citric acid 2g, Common salt 8g, Black salt 15g, Asafoetida 1g, Fennel powder 1g, Ajwain 0.5g, Black paper 2g, Cumin seeds (roasted) powder 1g, ginger 1.5g and Sugar 15g.

Technique:

Ingredients→ Grind the ingredients finally→ Straining through 80-100 mesh sieve→ Mixing thoroughly→ Packing the churns in airtight container/pouches→ Sealing→ Storing.

Triphala powder

Recipe:

Dried aonla 1kg, Dried Bahera 1kg, Dried harad 1 kg.

Technique:

Ingredients (aonla, bahera, harad) → removing of stone/seed of each ingredients→ Grinding separately to make powder→ Mixing of each powder in equal quantity→ Packing in glass bottles/pouches Sealing→ Storing.

Diabetes powder

Recipe:

Dried aonla 1kg, Guruch 1kg, and Turmeric 1kg.

Technique:

Dried aonla, guruch and turmeric→ Grinding into fine powder→ Straining/ Sieving→ Packing in glass bottles or polythene pouches→ Sealing→ Storing.

Dhatri Lauh Churn (Powder)

Recipe:

Aonla powder 1kg, Lauh bhasm 500g, Mulethi powder 250g, and Aonla juice 250ml.

Technique:

Aonla powder + Lauh bhasm + Mulethi powder→ Mixing ingredients thoroughly with the hand→ Mix little aonla juice properly→ Repeating the process 6 to 7 times→ Packing in glass bottles→ Sealing→ Storing.

Hygiene, Sanitation and Safety in Food Processing Units

Archana Singh
SMS, KVK, Mankapur, Gonda – II
A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya, U.P., India
archana1nduat@gmail.com

The food processing sector is one of the largest industries and full of potentials in India. It has lot of avenues related to different jobs in areas like its production, consumption, processing and value addition related to fruit and vegetable processing, grain processing, packaged foods, beverages, packaged drinking water, meat and meat processing industries, poultry and dairy industry etc. It also includes small scale industries like pickles & chutneys, bread, confectionery, rapeseed, mustard, sesame & groundnut oils, ground and processed spices, sweetened cashew nut products, tapioca sago and so on. One can export the products by producing the quality products and maintaining the Food safety practices while running an enterprise.

Food safety programs:

Food safety programs are practices, conditions and procedures needed prior to and during the implementation of a food safety system / Hazard Analysis and Critical Control Points (HACCP) plan. Core to any food manufacturer's food safety / HACCP plan are the facility's prerequisite programs. The foundation of each prerequisite program is its corresponding Standard Operating Procedures (SOPs). An SOP is a set of written instructions that document a food manufacturer's routine or repetitive activity. Specific to food manufacturing plants, the term SOP is commonly applied to production, manufacturing and support area processes, jobs or activities.

A fundamental requirement of any food process is that the food produced should be safe for consumption. Food safety is such a basic consumer expectation, that it is 'taken for granted' when we decide our meal from the menu options or purchase products from the retailer. Food safety management is the application of food policies, systems and processes in a food operation in order to prevent food borne illnesses and protect consumer health. The focus in food safety standards has shifted from end product requirements and testing to a preventive approach in food safety management, that addresses chemical, physical and biological risks through the use of Good Manufacturing Practices (GMP), Good Hygiene Practices (GHP) and Hazard Analysis Critical Control Point System HACCP - A systematic approach to identification, evaluation and control of food safety hazards.

Basic Rules of Hygiene, Sanitation and Safety in Food Processing

Food safety is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten according to its intended use. Good food hygiene is essential to ensure that the food prepared / sold by the manufacturer is safe. Food safety and hygiene are important both to safeguard consumer health and the reputation of enterprises.

Hygiene and sanitation: Personal hygiene

- Wear a hat / hairnet that completely covers the hair. Do not comb your hair in a processing room or storeroom.
- Cover all cuts, burns, sores and abrasions with a clean, waterproof dressing.

- Do not smoke or eat in any room where there is open food because bacteria can be transferred from the mouth to the food.
- Do not spit in a processing room or storeroom.
- Wash hands and wrists thoroughly with soap after using the toilet, eating, smoking, coughing, blowing your nose, combing your hair, handling waste food, rubbish or cleaning chemicals. Dry them on a clean towel before handling food again.
- Keep fingernails cut short.
- Do not wear perfume or nail varnish as these can contaminate products.
- Do not handle any food if you have sores, boils, septic spots, a bad cold, chest infection, sore throat or a stomach upset. Report any of these to the manager and do alternative work.
- Do not cough or sneeze over food.

Cleaning

- Clean the processing room, toilets and washing facilities, and storerooms every day.
- Use the correct chemicals to clean utensils / equipment, make sure there are no food residues and rinse the equipment with clean water of drinking quality.
- Make sure all cleaning cloths are washed and boiled each day. Do not hang them on equipment, products or window ledges to dry.
- Clean as you go -do not leave dirty equipment / utensils until the end of the day before cleaning it.
- Keep the outside area around the processing room clean and tidy, keep grass cut short.
- One effective way of preventing cross contamination in the factory is by the implementation of a colour code system.

Sanitation

- Put all wastes into bins that are not used for anything else. Empty the bins periodically during the day away from the processing site. Waste management should also be done to keep pace with the environmental sanitation as well.
- Prevent all animals from entering the processing area or storerooms.
- Visitors should only enter the processing room wearing protective clothing and under supervision.
- Keep food covered wherever possible.
- Keep all food, tools and equipment off the floor.
- Store ingredients in sealed containers.
- Do not use broken or dirty equipment.
- Report any signs of insects, rodents or birds to the manager.

Safe clothing and work practices

- Wear shoes that protect your feet from falling objects.
- Do not wear any loose clothing or jewellery that could get caught in running machines.
- Do not allow customers, children or animals into the processing room.
- Immediately clean up any water, oil or grease on the floor using sawdust, sand, husks etc.
- Cover burning electrical equipment with a damp cloth or sand. Never use water to put out flames.
- Shield gas burners from direct sunlight because the flames can become invisible.
- Do not put cleaning chemicals into old food containers.
- Have a first aid box containing sterilized dressings, cotton wool, adhesive plasters and bandages.

Operating machinery

- Ensure that only trained staff enter the premises or operate machines.
- Do not allow staff to start a machine unless they know how to stop it. Only one person should operate a machine at any one time.
- Make the layout of machinery logical and leave sufficient space around it so that there are few chances for operators to get in each other's way.
- Do not try to attract operators' attention by touching or calling them from behind if they are using a machine. Always speak to them from the front or wait until they have finished what they are doing.
- Train staff to be familiar with potential hazards and what they should do in case of an accident. Use charts hung on the wall near to each machine to show safety precautions.
- Ensure that guards are fitted and in place over any moving parts of a machine and alert staff to machines that appear to be standing still when running at high speed.
- Never allow staff to clean, adjust or lean over moving machinery and do not allow them to leave a running machine un-attended.
- Encourage operators to report any loose parts on a machine.
- Do not allow staff to work with equipment that is defective. Put a note on any machine that is under repair saying, 'DO NOT TOUCH'.
- Do not allow anyone to touch inside electric equipment while it is connected.
- Regularly check the cords of electrical appliances to ensure that outside covers are not broken, and wires are not exposed.
- It is also important to follow good food processing and preservation practices to produce safe foods in this sector.

With these points in mind one can establish an enterprise to satisfy customers as well as comply with the food safety and standards law with quality products. By establishing more and more units, we can be able to raise GDP.

Entrepreneurship Development through Value Addition and Processing of Aonla

Pawan Singh Gurjar

Scientist, Post-Harvest Management Division,
ICAR-Central Institute for Subtropical Horticulture, Rehmankhera, Lucknow
E-mail: pawan09996@gmail.com

Introduction

Indian economy is largely agrarian economy around 60 per cent population is depends on agriculture for livelihoods. However, the share of agriculture in India's Gross Domestic Product (GDP) is declining continuously and employment opportunities are decreasing in rural areas. Rural folks are migrating to metro cities in search of better employment and job opportunities. Agriculture/horticulture-based enterprises and start up development in rural areas is the fervent need of present time to provide jobs for rural youth in villages itself and stop migration. Processing and value addition sector are identified as the 'sunrise sector' sector of Indian economy by Government of India which has potential of providing millions of jobs in rural areas, helps in reducing post-harvest losses and augmenting farmers income. Uttar Pradesh state has many success stories in entrepreneurship and employment development through processing and value addition of aonla but it is restricted to one or two districts and yet not exploited fully. Therefore, more aonla based enterprises need to be established in aonla growing areas.

What is entrepreneurship: The process of designing, launching and running a new business which is often initially a small business by a person or group of people is known as entrepreneurship.

Need of entrepreneurship and start up development

Currently, we need more jobs for fresh graduates and degree holders. New enterprises and startups need human resources for starting and running a new business. Else, if there is no entrepreneurship then there is no business and no jobs for people. We need high-quality products and services at lower prices. When new entrepreneurs come, they bring new ideas to the market. They create new solutions to old problems; create new value chains that are why entrepreneurship is important.

Process of Entrepreneurship Development

Problem identification: A process of startup development start with the identification of problem in the society, value chain or supply gap of a product or service in the market. An entrepreneur identifies supply gap and then find a commercially viable solution.

Idea generation: An entrepreneurial process begins with the idea generation, wherein the entrepreneur identifies and evaluates the business opportunities. The identification and the evaluation of opportunities is a difficult task; an entrepreneur seeks inputs from all the persons including employees, consumers, channel partners, technical people, etc. to reach to

an optimum business opportunity. Once the opportunity has been decided upon, the next step is to prototype development.



Fig. 1: Process of entrepreneurship development

Prototype development: An entrepreneur is developing prototype of a product or service, provides it to the consumers for feedback and based on feedback it is improved further.

Business plan development: Once the prototype of a product or service developed, an entrepreneur has to build a complete business plan. It is the most important step for new business as it sets a standard and the assessment criteria and sees if a company is working towards the set goals.

Resources collection: The next step in the entrepreneurial process is resourcing, wherein the entrepreneur identifies the sources from where the finance and the human resource can be arranged. Here, the entrepreneur finds the investors for its new venture and the personnel to carry out the business activities.

Managing company: Once the funds are raised and the employees are hired, the next step is to initiate the business operations to achieve the set goals. First of all, an entrepreneur must decide the management structure or the hierarchy that is required to solve the operational problems when they arise.

Profit: The final step in the entrepreneurial process is harvesting wherein, an entrepreneur decides on the future prospects of the business, i.e. its growth and development. Here, the

actual growth is compared against the planned growth and then the decision regarding the stability or the expansion of business operations is undertaken accordingly, by an entrepreneur.

Entrepreneurship opportunities in aonla processing and value addition

Aonla fruits are highly beneficial with great nutraceuticals and pharmaceutical value (Pathak *et al*, 2003). Fruits are highly perishable and not suitable for fresh consumption due high acidity and astringency. Processing of aonla fruits is imperative for making it palatable. Therefore, aonla based processed products are always remain in high demand from consumers side. High demand for aonla based value added products is opens the ways for startup development in this area.

How to establish aonla based small scale enterprise and FSSAI laws

Small scale processing unit can be established in rural areas keeping into consideration the availability of raw material, available resources and marketing facility. New small-scale processing unit may be set up in rural areas by young entrepreneurs or self-help groups based on the following preservation techniques/products.

- ✓ Aonla juice
- ✓ Aonla preserve
- ✓ Aonla candy
- ✓ Aonla segment in syrup
- ✓ Aonla powder
- ✓ Aonla jam
- ✓ Aonla shreds
- ✓ Aonla supari
- ✓ Aonla pickle

Method of aonla candy preparation: Ingredients for making of candy from 1 kg aonla fruits are given below-

Aonla	1 kg
Sugar	1.120 kg
Water	500 ml
Citric acid	6.4g
KMS	1.2 g

Steps in candy preparation

- Preparation of sugar syrup (addition of 765g of sugar in 500ml of water)
- Addition of citric acid and KMS

- Soaking the fruit for 24hr
- Boiling of sugar syrup to 60 Brix
- Addition of remaining sugar
- Soaking for 24hr and increased the Brix to 70 Brix for 7 days
- Amla pieces and sugar (1:1.5)
- Packed the amla preserve in glass jar
- Dried in shade to get aonla candy



Photo 1: Aonla candy

Method of aonla preserve preparation

A mature fruit pieces impregnated with heavy sugar syrup till it becomes tender and transparent is known as preserve.

Ingredients: Ingredients for making of candy from 1 kg aonla fruits are given below-

Amla	1kg
Sugar	1kg
Alum	20g
Salt	20g
Citric Acid	1.5g
Water	1L

- Prick with fork, needle or goose berry pricker.
- Steep in 2% salt solution for 24 hrs to remove astringency

- Wash and dip in 2% alum solution for 24 hours then wash thoroughly
- Blanch until soft but segments do not break or crack.

General considerations

- Cooking of amla directly in syrup causes shrinking of fruit and reduces absorption of sugar.
- Therefore, the fruit should be blanched first to make it soft enough to absorb water, before steeping in syrup.
- Fruits may be cooked in syrup by two processes as given below:

Rapid process

- Amla are cooked in low sugar syrup. Boiling is continued with gentle heating until the syrup becomes sufficiently thick.
- Rapid boiling should, however, be avoided as it makes the fruit tough, especially when heating is done in a large shallow pan with only a small quantity of syrup.
- The final concentration of sugar should not be less than 68% which corresponds to a boiling point of 106 ˚C.
- This is a simple and cheap process, but the flavour and colour of the product are lost considerably during boiling.

Slow process

- The amla is blanched until it becomes soft.
- Sugar, equal to the weight of fruit, is then added to the fruit in alternate layers and the mixture allowed standing for 24 hrs.
- During this period, the amla gives out water and the sugar goes into solution, resulting in a syrup containing 37-38% TSS.
- Next day, the syrup is boiled after removal of amla to raise its strength to about 60% TSS.
- A small quantity of citric acid (1 to 1.5 g/ kg sugar) is also added to invert a portion of the cane sugar and thus prevent crystallization.
- The whole mass is then boiled for 4-5 min. and kept for 24 hrs.
- On the third day, the strength of syrup is raised to about 65% TSS by boiling.
- The fruit is then left in the syrup for a day.
- Finally, the strength of the syrup is raised to 70% TSS and the amla are left in it for a week.
- The preserve is now ready and is packed in containers. This method is usually practiced.



Photo 2: Aonla preserve

Aonla juice: Flowchart for aonla juice preparation is given below-

Fruits

↓

Washing

↓

Seed removal and separation into segments

↓

Addition of water (1:1)

↓

Passing through pulper

↓

Filtering

↓

Boiling at temp 78^0 C

↓

Addition of KMS

↓

Filling in sterilized bottles

↓

Pasteurization for 20 minutes

↓

Cooling



Photo 3: Aonla juice

Requirements for establishment of processing unit: One should consider availability of raw material for processing, financial requirements, uninterrupted water and electricity supply and marketing of processed products for establishment and successful running of processing unit. FSSAI license issued by food safety department of concern state government is necessary for building consumers' confidence in product and it will also facilitate marketing.

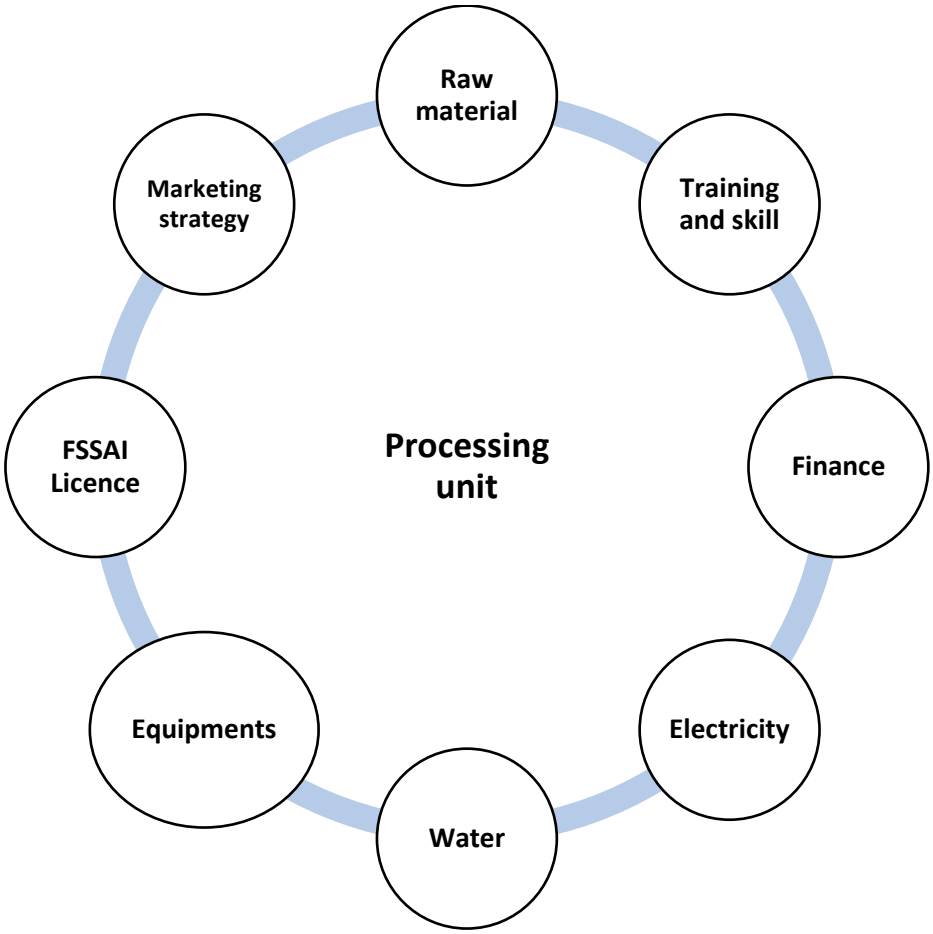


Fig. 2. Requirements for establishment of fruits and vegetable processing unit

Food safety laws

The Food Safety and Standards Authority of India (FSSAI) was established to implement the rules and regulations of FSS act under the aegis of Ministry of Health and Family Welfare,

Government of India which is headquartered in New Delhi. It ensures the availability of safe food products for human consumption by laying down a set of safety standards in lieu to regulate the manufacturing, distributing and storing of the food products. It is thus responsible for promoting the public health among the masses by keeping a regular check.

To whom it required

FSSAI Registration or Food License is required for all type of the food related business. Even if you are thinking to starting a food related business by way of food processing or manufacturing or distributor then its required from starting irrespective of the turnover.

Types of FSSAI Food Licenses: FSSAI issues three different types of food licenses

Basic FSSAI Registration: The petty and small-sized food business operators like manufacturers, transporters, storage units, distributer, marketers, retailers, etc. are required to acquire a Basic FSSAI Registration which is issued by the State Government for a minimum period of one year and a maximum of 5 years. It is mostly for the units having an annual turnover of less than 12 lakh. The rest depends on the eligibility; the FBO can thus fall under either the State FSSAI License or the Basic Registration.

State FSSAI License: The authority has guided the food business operators, having an annual turnover of more than 12 lakh, like small to medium-sized manufacturers, storage units, transporters, marketers, retailers, distributors, etc to obtain the State FSSAI License. It is issued by the respective State Government having a minimum validity of one year and the maximum of 5 yrs.

Central FSSAI License: Food business operators who have a turnover greater than 20 crores like large manufacturers, 100% export oriented units, importers, operators in the Central Government agencies, airports, seaports, etc are enforced to obtain a Central Food License issued by the Central Government. Also, the FBO's are directed to obtain the Central License for their head office and if they operate in more than one state. The minimum tenure of this license is one year, and the maximum is 5 years.

Documents required for Basic FSSAI – Food License: Latest Passport sized photograph of the applicant, Identification proof (voter ID card or Aadhaar Card), PAN Card, Address Proof- Telephone or Mobile Bill/ Electricity or Gas Bill), Copy of Property papers (if owned), Copy of Rent Agreement and NOC letter from the Landlord (if rented)

Documents required for FSSAI State License: Form-B duly completed and signed by the Proprietor, Blueprint or layout of the area location, Proof of possession of premises, Partnership affidavit of Proprietorship, Contact details of the Directors, List and details of the types of equipment and machinery, Proprietor's photo ID and Address Proof issued by the Government of India. In case of a company, the Directors photo ID and address proof, List of food category that has to be manufactured, Authority letter with name and address of the responsible person, NOC and Copy of License from the manufacturer and Food Safety Management System Plan or Certificate.

FSSAI License Registration Procedure

1. **Process for basic Registration**

- For licensing it is mandatory that the food business operator has an active email ID and a telephonic phone number.
- The business name of the respective food business operator must be spelled out correctly in the application form as the same name will appear on the license.
- After the successful submission of the application, a unique reference ID is issued that is to be used in all the further applications.
- The next and the last step is payment of the prescribed fees. This is to be done by taking out a print of the acknowledgment and the online application and make a demand draft of the specified amount.

2. **Procedure for State License Application**

- Before applying for a State FSSAI License it is important to check the eligibility criteria as mentioned by the Food Safety and Standards Authority of India.
- After successfully checking the eligibility criteria the next step is to furnish the application form for obtaining the State FSSAI License. Every data provided to the department must be correct and appropriate.
- Remember that the generic names must be mentioned for the products and not the brand names.
- All the products as mentioned in the license must be approved as per the FSS Act, 2006.
- At last, you will be asked for how many years you want to apply. You have to choose the appropriate period of time for which you wish to take the license.
- Post-filing the form, the prescribed fees have to pay either through an online portal or by submitting the demand draft at the FSSAI state office.

Suspension and Cancellation of Food License

Under the below-mentioned circumstances, the food license can either be canceled or suspended:

- Food poisoning outbreaks those are associated with the spread of the disease.
- Serious food complaints in cases where the consumer's safety is affected.
- Food Business Operator's non-compliant premises.
- Serious violations of the FSSAI rules and compliances.

- Non- compliance with an improvement or other legal notice without reasonable excuse.
- Interrupting an officer doing inspection.

Conclusion

Large number of innovative technologies and modern equipment has been developed for preservation of fruits and vegetables. Linkages among farmers, entrepreneurs, investors and market are need of the hour for development of processing infrastructure in the country. Establishment of processing industry and value chain development by forward linkages with market and backward linkages with farmers will help in doubling farmer's income, employment generation and reduction in post-harvest losses.

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Preservatives for Fruits and Vegetables Processing

Bhagwan Deen
Prof. & Head, Department of Post-Harvest Technology
College of Horticulture and Forestry
A.N.D. University of Agriculture &Technology, Kumarganj, Ayodhya, U.P., India
Email: drbdpasi@gmail.com

Preservatives: According to FSSAI "Preservative" means a substance which when added to food, is capable of inhibiting, retarding or arresting the process of fermentation, acidification or other decomposition of food.

Classification of Preservatives:

Preservatives are divided into following two classes:

1. **Class I preservative:** The preservatives under this class are generally regarded as safe (GRAS) for human consumption. These preservatives are normally consumed daily and there is no quantity-wise or product-wise restriction on their use. The following preservatives are classified as class I preservatives and these preservatives are usually used in the preservation of fruits and vegetables-
    - Common salt
    - Sugar
    - Dextrose
    - Glucose Syrup
    - Spices
    - Vinegar or acetic acid
    - Honey
    - Edible vegetable oils

    Addition of Class I preservatives in any food is not restricted, unless otherwise provided in the FSSAI regulations. Provided that the article of food to which a Class I preservative has been added conforms to the specifications laid down in Chapter 2 of FSSAI regulations.

2. **Class II preservatives:** The class-II preservatives are not generally regarded as safe and may be used in certain food products only in restricted quantity. There is quantity wise and product wise restriction on their use by the law because these chemicals are not very safe for human consumption. The name of class-II preservatives their quantity and the products in which they may be used are enlisted in the FSSAI regulations. The class II preservatives are-
    - Benzoic acid including salts thereof,
    - Sulphurous acid including salts thereof,
    - Nitrates or Nitrites of Sodium or Potassium in respect of food like ham, pickled meat,

- Sorbic acid including its sodium, potassium and calcium salts, propionates of calcium or sodium, lactic acid, and acid calcium phosphate.
- Nisin
- Sodium and calcium propionate.
- Methyl or propyl Parahydroxy-Benzoate.
- Propionic acid, including esters or salt thereof,
- Sodium diacetate, and
- Sodium, potassium and calcium salts of lactic acid.

The Use of more than one Class II preservative is prohibited under law. The Acceptable Daily Intakes (ADI) of class-II preservatives are presented in Table-1

Table-1: Acceptable Daily Intakes (ADI) of important class-II preservatives

Synod.	Important class-II preservatives	ADI (mg/kg body weight)
1	Benzoic acid and its Na/K salts expressed as benzoic acid	0 to 5.0
2	Sulphurous acid (H_2So_3) and its salts calculated as So_2	0 to 0.7
3	Sodium or potassium nitrites calculated as sodium nitrite	0 to 0.2 (temporary)
4	sodium or potassium nitrites calculated as nitrate	0 to 5
5	Sorbic acid and its Ca/K/Na salts expressed as sorbic acid	0 to 25

The two class II preservatives which are most used in the preservation of fruits and vegetables are described below:

Benzoic acid and Sodium Benzoate

Sodium benzoate (C_6H_5COONa) is a sodium salt of benzoic acid (C_6H_5COOH) which can be produced by reacting sodium hydroxide with benzoic acid. The food grade sodium benzoate is white, odour less, amorphous powder, flakes or granules and conforms to IS: 4447-1994 of Bureau of Indian standard. As food additive, sodium benzoate has E number E211. The solubility of the sodium benzoate is temperature dependent and its solubility increases from 62.8g/100 ml water at 0^0C to 74.2g/100ml water at 100^0C. The sodium benzoate should be of food grade otherwise impurities may import bad benzene smell in the products. It is slightly hygroscopic, but moisture absorption does not alter its quality in any way. Sodium benzoate produces benzoic acid in the acidic medium of foods and benzoic acid acts as preservative but instead of benzoic acid sodium benzoate is added as food preservative because sodium benzoate solubility is more in water than benzoic acid. The 1g sodium benzoate is soluble only in 2 ml water whereas 1g benzoic acid requires 350 ml water. The food grade benzoic acid is white flakes or crystal with faint characteristic odour and it should conform to IS: 4448-1994 of Bureau of Indian Standard. Benzoic acid is the active ingredient in sodium benzoate and 1g of sodium benzoate produces 0.85 g benzoic acid when added in the processed fruits and vegetable products thus 1g benzoic acid is equal to 1.2g sodium benzoate. Parohydroxy benzoic acid is widely distributed in plant tissues and is a normal constituent of wine. Benzoic acid is also present naturally in cranberries (*Vaccinium*

oxycoccos or *Oxycoccus palustris*), prunes (*Prunus domestica*), greengage plum (*Prunus domestica* ssp. *italica* var. claudiana), cinnamon (*Cinnamomum zeylanicum*), clove (*Syzygium aromaticum*), apple (*Malus domestica*), red raspberry (*Rubus idaeus*) and black raspberry (*Rubus occidentalis*).

Table-2: Upper limit of benzoic acid in fruit and vegetable products as per FSSAI

Processed fruit and vegetable products	Maximum concentration of Benzoic acid (ppm)
Jam, marmalade, preserve canned cherry and fruit jelly	200
Non-alcoholic wines, squashes, crushes, fruit syrups, cordials, fruit juices and barley water or to be used after dilution	600
Ready to serve beverages	120
Pickles and chutneys made from fruits or vegetables	250
Tomato and other sauces, Tomato puree and paste	750
Syrups and sharbats	600

The antimicrobial action of sodium benzoate is due to undissociated portion of benzoic acid that plays role in preservation. The foods should be acidic for better action of this preservative because the pH of the food decides the dissociation of benzoic acid and thereby efficiency of sodium benzoate. Sodium benzoate is more efficient at lower pH and its antimicrobial action is excellent at 2 to 4 pH and is not very effective above 5 pH whereas esters of benzoic acid are more effective in microbial inhibition than benzoic acid and can be used in foods of a wide range of pH. Sodium benzoate is most suitable for foods and beverages having pH below 4.5. It is best for pickle preservation because vinegar used in pickle making and lactic acid produced during pickling lowers the pH. Sodium benzoate inhibits or kills microorganisms by interfering with the permeability of microbial cell membrane and is more effective against yeast and moulds than bacteria. In some bacteria nutritional starvation of microorganism is caused by inhibition of membrane transport of amino acids. It reduces intercellular pH in *E. coli* and thereby microorganism starved to death. Sodium benzoate and sodium chloride have considerable synergistic effect. Benzoic acid may be used in the preservation of fruit and vegetable juices, fruit pulp, beverages, squashes, crushes, fruit syrups, jam, marmalade, chutney, tomato sauce, puree, pastes and pickles. It is also recommended to preserve beverages containing natural anthocyanin colour because contrary to KMS it does not bleach the anthocyanin colour of the beverages. The International programme on chemical safety found no adverse effect in humans at dose of 647-825 mg/kg of body weight per day. Sodium benzoate has no cumulative effect and it excretes in urine in the form of hippuric acid within a short time. The benzoate in excess of 0.1% may import a disagreeable ‘peppery’ or burning taste to fruit juices.

Sulphurous acid including salts thereof (Potassium metabisulfite)

Sulphurous acid (H_2So_3) is an unstable acid produced when So_2 dissolves in the water. It is used as food preservative and as bleaching agent. Sulphur dioxide is colorless, suffocating, pungent smelling, non-inflammable gas. It is readily soluble in water (85g/100 ml at 250C) and has been used for many centuries as a fumigant and specially as wine preservatives. Sulphur dioxide is used as a gas or in the form of its sulfite, bisulfite and metabisulfite salts which are powders. Metabisulfite salts are more stable to oxidation than

bisuphites, which in turn show greater stability than sulphites. The most effective pH range of Sulphur dioxide is 2.5 to 5.0 and is added to foods for its antimicrobial effects, antioxidant properties and to prevent enzymatic and non-enzymatic browning.

Potassium metabisulfite ($K_2S_2O_5$ or $K_2O_5S_2$) , also know as Potassium pyrosulfite is a white crystal powder with pungent Sulphur odor ; is most common forms used in fruits and vegetables preservation. The molecular weight of potassium metabisulfite is 222.32g/mol and solubility in water is 450g/l at 20^0C. The food grade potassium metabisulfite is also known as E224. One molecule of Potassium metabisulfite(222g) yields 2 molecules of Sulphur dioxide(128g) or potassium metabisulfite (KMS) releases 57.7% Sulphur dioxide [(128/222)/100=57.7%], therefor 1.75 factor is used in the calculation of potassium metabisulfite quantity in gram to be added in the foods. The KMS amount can be calculated for know quantity of processed products with following formulae-

KMS in g = (So_2 in ppm x beverage in l x 1.75)/1000

Table-3: Upper limit of Sulphur dioxide in fruit and vegetable products as per FSSAI

Processed fruit and vegetable products	Maximum concentration Sulphur dioxide (ppm)
Jam, marmalade, preserve canned cherry and fruit jelly	40
Nonalcoholic wines, squashes, crushes, fruit syrups, cordials, fruit juices and barley water or to be used after dilution	350
Ready to serve beverages, beer	70
Pickles and chutneys made from fruits or vegetables	100
Fruit juice concentrate	1500
Syrups and sharbats	350
Dried apricots, peaches, apples, pears and other fruits	2000
Raisins and Sultanas	750
Fruit and fruit pulp not otherwise specified in the schedule	350
Fruits, vegetables, flakes, powder, figs	600

The potassium metabisulfite is used to preserve a variety of foods like wines, fruit juices, pickles, syrups, dehydrated/dried fruits and vegetables and semi processed foods like fruits pulp.

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Aonla Products- Sauce, Chutney and Pickle

Vinod Singh
SMS, KVK, Varanasi
A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya, U.P.

Aonla, the Indian goose berry is one of the richest sources of Vitamin C. The deficiency of Vitamin C causes various diseases such as scurvy, anaemia, failure of wound healing, scorbutic bone formation and rough skin. Therefore, aonla play an important role in human nutrition. The importance of this fruit is also due to its high content of tannin i.e. gallotanic acid which on hydrolysis yields gallic acid. The gallic acid present in aonla fruit has antioxidant property. The stability or retention of vitamin C in aonla products due to this polyphenol is a matter of great concern for processors.

Aonla fruit is sour and astringent in taste, hence it is not popular as table fruit. The excellent nutritive and therapeutic values of fruit have great potentiality for processing into various quality products which can get position in national and international markets. Fruit are also used in Shampoos, hair dyes and ink industries. Organic acids and phenolic substances of aonla fruits are uses for drugs. Oil derived from aonla fruit has property for promoting hair growth. Extracts of aonla fruit has been found useful in inhibiting microbial activity. Thus, the various uses of aonla fruits shows immense possibility for establishment of various industries.

Processing:

Aonla is not popular as table fruit because of its astringent taste. It has great potentiality for processing into number of quality products. The nutritional and therapeutic values of aonla products have better potentiality for the establishment of agro-processing industries in the rural areas which may yield the results of social and great economic values.

The pulp extraction technique, recipe and flow sheet for preparation of few important products are as under:

Aonla Pulp

Extraction technique:

Fruits →Heating in boiling water (10 minutes) →Separation of segments (Seed removal) →Addition of water (in the ratio of 1:1) →Passing through pulping machine→ pulp.

Pulp preservation:

Pulp →Heating up to 85^0C →Mixing with 1000 ppm So2 (2g sodium metabisulphite/kg of pulp)
→Filling into HDP Jar or in glass bottles→ Sealing →Storage.

Preserved aonla pulp can be used for preparation of various products such as Jam, Chavanprash, toffee, sauce, chutney, sweets and beverages.

Aonla Sauce

Recipe:

Aonla pulp 1 kg, sugar 75 g, salt 10 g, onion 50 g, garlic 5 g, ginger 10 g, red chilies powder 5 g, hot spices 10 g, acetic acid 2 ml and sodium benzoate 0.25 g.

Technique:

Aonla fruits→ Washing →Heating in boiling water for 10 minutes→ Separation of segments and removal of stone→ Addition of water in ratio of 1:1→ Passing through pulper → Straining →Pulp →Mixing with one third sugar (25 g) →Cooking →Adding extracts of onion, garlic, ginger, chilies and hot spices while cooking →Adding acetic acid and remaining sugar→ Testing of end point for desired consistency →Addition of salt →Addition of sodium benzoate (by dissolving in water) →Bottling →Crown corking → Processing in boiling water for about 20 minutes →Cooling → Storing.

Aonla Pickle

Recipe:

Aonla 1 kg, salt 150 g, nigella seed 10 g, red chili powder 10 g, fenugreek 30 g, turmeric powder 10 g, cumin powder 50 g and edible oil 350 ml.

Technique:

Aonla →Washing →Blanching till it becomes soft → Separation of segment and seed removal →Frying spices in oil → Mixing with segments →Frying for 5 minutes →Mixing salt →Filling into jar →Keeping in sun for a week →Storing.

Aonla Chutney

Recipe:

Aonla fruit 1.25 kg, sugar 1 kg, salt 50 g, ginger 15 g, hot spices 25 g, red chilies 10 g and glacial acetic acid 10 ml.

Technique:

Matured fruit→ Washing →Steam for 15 minutes in pressure cooker →Pass through pulper →Fine pulp →Mix with all ingredients except acetic acid →Cook the mixture to a desired consistency →Add glacial acetic acid →Fill into glass bottles→ Capping/sealing→ Cooling →Storing.

Preparation Technology of Aonla based Blend Beverages

Sanjay Pathak

Prof. & Head, Department of Fruit Science
College of Horticulture and Forestry
A.N.D. University of Agriculture & Technology, Kumarganj, Ayodhya, U.P.

Aonla, the Indian gooseberry is one of the richest sources of vitamin C. The deficiency of vitamin C causes various diseases such as scurvy, megaloblastic, anemia, failure of wound healing, bone formation and rough skin therefore, aonla play an important role in human nutrition. The importance of this fruit is also due to its high content of tannin i.e. gallotanic acid which on hydrolysis yields gallic acid present in aonla fruit has antioxidant property. The stability or retention of vitamin C in aonla products due to this polyphenol is a matter of great concern for processors. Aonla fruit is very popular for its medicinal property recorded both in Ayurvedic and Unani system of medicines. This is one of the most important fruit which fil the gap of astringent food recommended by Ayurvedic system of medicines for a balanced diet and sound health. Fruit is acrid, cooling refrigerant, laxative and diuretic. Dried fruit is useful in hemorrhage, chronic dysentery diarrhea, diabetes, dyspepsia, cough, anemia and jaundice.

Aonla fruit is sour and astringent in taste, hence it is not popular as table fruit. The excellent nutritive and therapeutic values of fruit have great potentiality for processing into various quality products which can get position in national and international markets. Now days, most of the people are health conscious and they prefer to drink low calorie nutritious beverages. Aonla beverage may takes place an important place in such type of industries. Some of the important aonla beverages technologies are as follows-

Aonla Juice

Technique:
Collection of fruit →sorting →Trimming →Washing →Grating / Passing through Grater machine →Passing through basket Press machine/ Hydraulic press machine Juice extraction →Straining →Addition of preservative →Bottling →Capping and labeling →Storage.



Aonla Squash

Recipe: Aonla Juice – 25%, T.S.S.- 50%, Acidity-1.0% and KMS- 350ppm.

Technique:

Aonla Juice →Mixing with Syrup Solution →Addition of Preservative →Mixing →Bottling →Capping →Labeling →Storage.

Aonla + Alovera Squash

Recipe: Aonla Juice + Alovera pulp - 25% (aonla 60% and alovera 40%), T.S.S.- 50%, Acidity- 1% and KMS- 350ppm.

Technique:
Pulp →Mixing with Syrup Solution →Addition of Preservative →Mixing →Bottling →Capping →Labeling→ storage.

Aonla+ Ginger Squash

Recipe: Aonla + Ginger Juice- 25% (aonla juice 80% + ginger 20%), T.S.S.-50%, Acidity- 1% and KMS- 350 ppm.

Technique:
Aonla juice+ Ginger juice →Mixing with Syrup Solution →Addition of Preservative →Mixing →Bottling →Capping →Labeling →Storage.

Aonla + Mango Squash

Mango Variety: Amrapali
Aonla varieties**:** Chakaiya, NA-6 & NA-7

Recipe: Juice+Pulp-25% (aonla juice 25% + Mango Pulp75%), T.S.S- 50%, Acidity- 1% and KMS- 350 ppm

Technique:

Aonla juice + Mango pulp →Mixing with Syrup Solution →Addition of Preservative →Mixing →Bottling →Capping →Labeling →Storage.



Aonla + Alovera R.T.S.

Recipe:

Juice+ pulp - 10% (aonla Juice 60% + alovera pulp 40%), T.S.S. – 12%, Acidity- 0.25% and KMS – 70 ppm.

Technique:

Aonla + Alovera juice → Mixing with Syrup Solution → Addition of Preservative → Bottling → Crown Corking → Pasteurization → Air Cooling → Storage.

Aonla + Ginger R.T.S

Recipe: Aonla juice + ginger juice - 10% (aonla Juice – 80%, Ginger Juice – 20%), T.S.S.- 12 %, Acidity- 0.25 % and KMS-70 ppm.

Technique:

Aonla + Ginger juice → Mixing with Syrup Solution → Addition of Preservative → Bottling → Crown Corking → Pasteurization → Air Cooling → Storage.

Aonla + Mango R.T.S.

Recipe:

Aonla Juice + mango pulp –10% (aonla juice 25%+ Mango Pulp 75%)

T.S.S. 12% and Acidity – 0.3

Technique:

Mix aonla + mango Pulp → Mixing with Syrup Solution (Sugar+ Water + Citric Acid) → Addition of Preservative → Bottling → Crown Corking →Pasteurization (20 minutes at boiling Temperature) → Air Cooling → Storage.

Aonla R.T.S.

Recipe: Aonla Juice – 10%, T.S.S.- 12%, Acidity -0.25% and KMS -70 PPM.

Technique:

Aonla juice → Mixing with Syrup Solution → Addition of Preservative → Bottling → Crown Corking → Pasteurization → Air Cooling → Storage.

The Uttar Pradesh Food Processing Industry Policy-2017

R.P. Gautam
Principal, Government Food Science Training centre
Faizabad, Ayodhya, U.P. 224001

1. Background

The Horticulture and Food Processing sector of Uttar Pradesh has vast prospects for capital investment, employment generation and augmenting rural income. In India, so far as production of food-grains, horticultural crops and milk is concerned, Uttar Pradesh occupies a prominent place. In view of a huge market, low production cost, human resource and sufficient availability of raw material. There are ample possibilities for setting up horticulture and food processing-based industries in the state. That is why the Uttar Pradesh Government is determined to develop the state as a food park state.

In view of production of the abundance of food-grains, horticultural produce, milk and other agricultural produce in different agro-climatic zones of Uttar Pradesh, now it has become all the more pertinent to make available processed food products to the common people by converting the surplus produce into a value added chain. In the backdrop of rather easily available workforce, a large quantity of produce worth processing and immense possibilities of employment generation in the state, the Uttar Pradesh Food Processing Policy2017 is required in order to multiplying the well-planned development of food processing industry in the state.

1.1 A consistent growth has been noticed in the demand of processed products as a result of changing food habits due to rapid urbanisation, population growth, smaller families, increase in family income and busy lifestyles.

1.2 Uttar Pradesh is brimming with exciting possibilities of developing the food processing sector, investing capital in the sector, generating employment and increasing income for all stakeholders.

1.3 In sequel of the Uttar Pradesh Industrial Investment and Employment Promotion Policy-2017, the Uttar Pradesh Food Processing Industry Policy-2017 is being promulgated to set up and develop food processing industries and to further augment the current food processing opportunities in the state.

2. Vision & Implementation of the Policy

As per different reports and the survey undertaken by the Government of India, the value addition and the level of processing both are comparatively less in India as compared to other countries. The level of processing is 10 percent in the country and 06 percent in Uttar Pradesh. In other countries the percentage is much higher. There is an urgent need to promote capital investment in a big way in the food processing sector in India and the state of Uttar Pradesh. The Government of India has

targeted to achieve a level of value addition and processing upto 20% in next five years. Achieving the same level is also proposed in Uttar Pradesh.

2.1 Vision

To ensure balanced economic development of the state and provide maximum benefit to all stake holders by establishing Uttar Pradesh as a leading state in food processing sector.

2.2 Objective

The main objective of the Uttar Pradesh Food Processing Industry Policy2017 is to ensure fair and remunerative price of the produce to the growers, value addition to the price of raw produce, promote setting up of food processing industries, easy availability of processed food products to consumers at competitive prices, generation of new employment opportunities to build capacities and increase the skill level of the manpower in this sector and also make available additionally required manpower.

2.3 Implementation of the Policy

The Policy will remain operative for a period of 05 years since the date of its notification. If in any stage, a situation does arise, that demands an amendment of the Policy, the Honourable Council of Ministers only shall be authorised to approve such amendment of the Policy.

3. Areas Covered Under Food Processing

Following industries will be the part of the food processing industries:

- Processing of fruits and vegetables, flowers, spices, medicinal & aromatic plants and mushrooms.
- Processed products based on agricultural produce such as food-grains, pulses and oilseeds.
- Processing of agro-based products like milk powder, baby milk food, malted milk food, condensed milk, ghee, other dairy products, poultry and eggs, meat and meat products.
- Fish processing.
- Processing related to bread, oilseed, edible food items, breakfast food, sweets (including coco processing and chocolate production), malted extracts, protein isolates, and food items rich in protein, weaning food and extruded food products.
- Specialised packaging for food processing industries.
- Reefer vehicles/mobile pre-cooling vans.
- Creation of infrastructure based on the post-harvest management and agro processing cluster.

4. Priority Sector

4.1 Development of Infrastructure Facilities

For growth of food processing industries, there must be quality infrastructure facilities in the state. The infrastructural facilities provisioned under the Industrial

Investment & Employment Promotion Policy-2017 will also be equally applicable to the food processing industries of the state.

4.2 Identification of Food Processing Zones

Food processing zones will be identified on the basis of availability and suitability of the local raw material for setting up food processing industries in various districts of the state. Priority will be accorded to set up suitable food processing industries in these zones. Besides, food parks and mega food parks will also be established in these zones. Efforts will be made to develop Uttar Pradesh as a Food Park State with the objective of ensuring a remunerative return to farmers of their produce.

4.3 Development of Food Processing Park, Mega Food Park & Cold Chain Facility

Thrust will be given on setting up of infrastructure facilities based on zone wise clusters, Food processing parks will be established in specific zones in cooperation with the Uttar Pradesh State Industrial Development Corporation Ltd. (UPSIDC) and private sector. These parks will have facilities for packaging, export and research. Emphasis will be given on establishing infrastructural facilities like Mega Food Parks and cool chain in suitable areas of the state. A mega project under the food processing sector is the one in which Rs. 50 crore or more is invested.

4.4 Providing conducive atmosphere for setting-up Food Processing Industry

(1) The State Government will make sincere efforts to meet the basic requirements of the entrepreneurs for setting up of food processing industries in the state.

(2) Rules and procedures have been simplified under the Uttar Pradesh Industrial Investment & Employment Promotion Policy-2017, provisions related to Labour, Energy, Environment, Commercial Tax, Department of Agriculture Marketing & Agriculture Foreign Trade and other concerning departments, will also be applicable to the food processing industrial units to be set-up in the state under this policy.

(3) Under e-governance, computerization of the offices of Food Processing Department will be augmented, so that information can be exchanged easily through internet and all information can be given to the entrepreneurs under one roof. These centres will act as a bridge for reinforcement of the forward and the backward linkages.

4.5 Simplification of Procedures

(1) The Horticulture & Food Processing Department, Uttar Pradesh will ensure simplification of the procedures for implementation of facilities to be made available under the Policy.

(2) The Horticulture & Food Processing Department will evolve a Single Window System on the pattern of Udyog Bandhu for convenience of investors. Besides, arrangements will also be made at division and district levels to give information

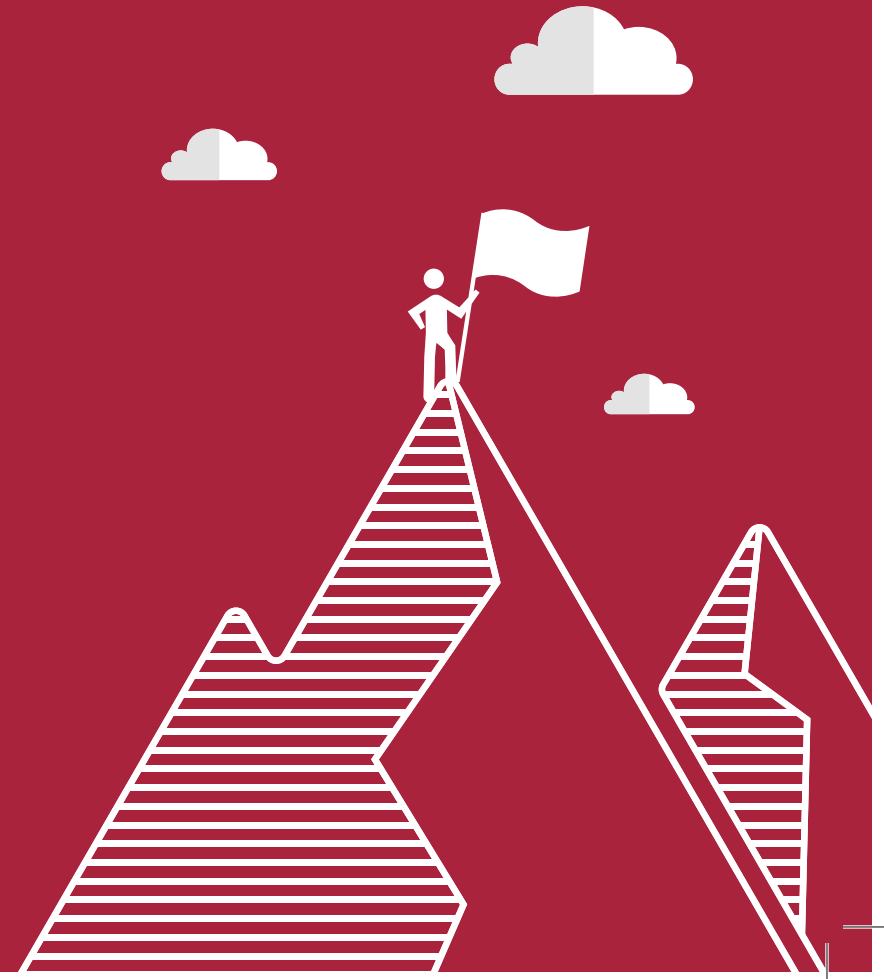
to the investors regarding available facilities for setting up of food processing industries.

For complete details visit http://www.uphorticulture.gov.in/en/page/food-processing-industrial-policy-2017

Source: Department of Horticulture and Food Processing, Government of Uttar Pradesh website

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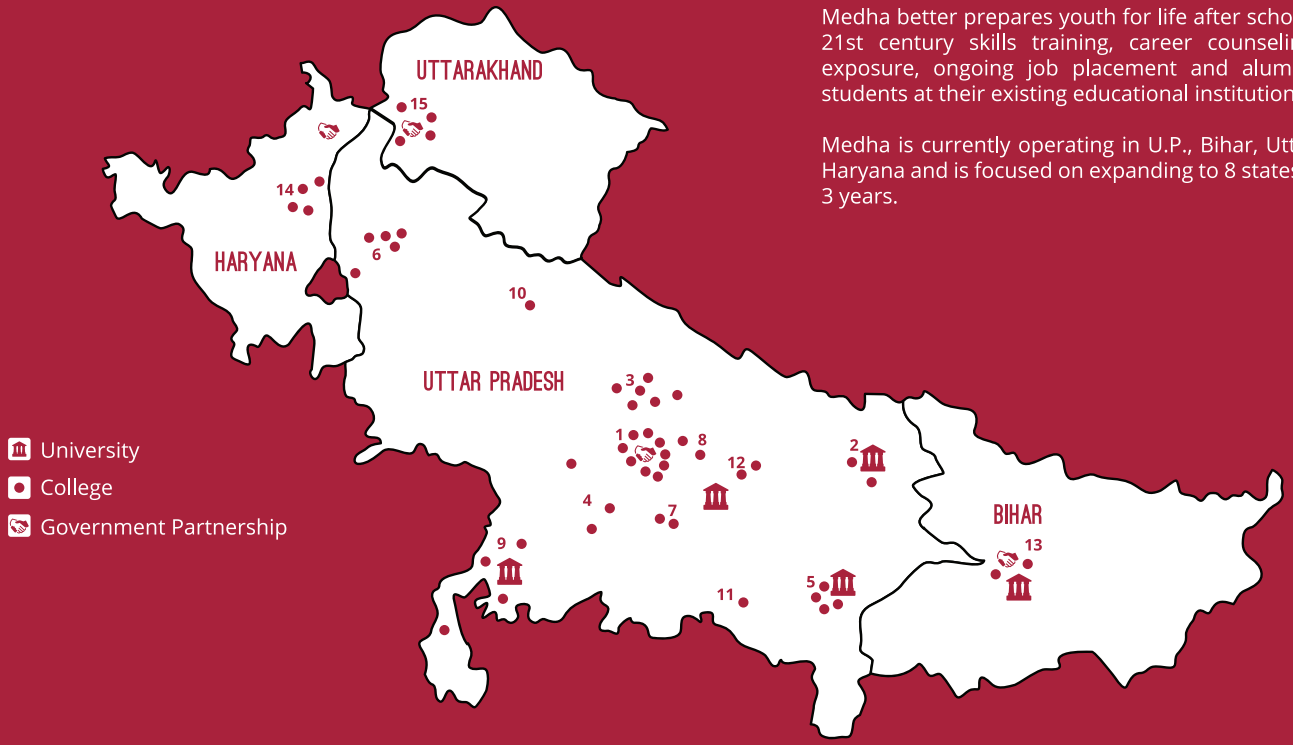
CURRICULUM OVERVIEW



About

Medha better prepares youth for life after school. We provide 21st century skills training, career counseling, workplace exposure, ongoing job placement and alumni support to students at their existing educational institutions.

Medha is currently operating in U.P., Bihar, Uttarakhand and Haryana and is focused on expanding to 8 states over the next 3 years.



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407 Dr. Baijnath Road, New Hyderabad, Lucknow,
Uttar Pradesh 226007. 0522 4044932 medha.org.in

LAB

LIFE SKILLS ADVANCEMENT BOOTCAMP

30 hrs

	Topic	Learning Objectives	Topic	Learning Objectives
Look Within (10 hours)	Self-identity	• Identify your personal values and beliefs • Understand who you are	Dilemmas	• Analyze dilemma scenarios • Develop value-based decision making frame work
	Strengths and Opportunities	• Gain knowledge of your strengths • Recognize how/when they can be used in life	Orientation and Reflection	• Give feedback on trainers and the program • Introspect and reflect on learnings • Map you LAB journey
	Emotional Intelligence	• Build awareness of your range of emotions • Communicate effectively about your emotions		
Face the World (10 hours)	Team Collaboration	• Solve complex problems as a team • Manage limited time and resources • Resolve conflict and communication gaps	Goal Setting	• Set future goals and milestones • Understand needs and dependencies of goals
	Stress Management	• Identify sources of stress in daily life • Develop stress management techniques • Plan and manage time more effectively		
Speak Out (10 hours)	Public Speaking	• Gather useful information for presentations • Increase confidence when speaking in public • Improve speaking effectiveness with tips & tricks • Assess strengths and weaknesses in public speaking	Group Discussion	• Communicate your opinion effectively • Listen intently and respond with meaning • Assess strengths/weaknesses in group discussion
	Group Presentation	• Craft a cohesive story as a team • Leverage individual strengths/weaknesses • Manage Q&A from an audience		

TAB

TECHNOLOGY ADVANCEMENT BOOTCAMP

60 hrs

	Topic	Learning Objectives	Topic	Learning Objectives
Computer Basics (15 Hours)	Operating System	• Navigate the operating system • Input using the mouse and keyboard	Transliterate	• Type in Hindi using the English keyboard
	Files and Folders	• Copy, paste, save, move files and folders	Market research	• Find useful information online
	Internet	• Search online for career information • Create an email and social networking account	Assessment	• Test your speed and accuracy
MS Word (15 Hours)	Word Intro	• Understand the usefulness of MS Word	Resume Writing	• Build a strong CV and cover letter
	Typing	• Improve typing speed and accuracy	Reviewing	• Review documents for collaboration
	Formatting	• Format documents for effective communication	Assessment	• Test your MS Word capabilities
MS Excel (15 Hours)	Excel Intro	• Understand the usefulness of MS Excel	Charts	• Build visual elements for communication
	Data Entry	• Enter data correctly into Excel worksheets	Adv. Functions	• Understand VLOOKUP and Pivot Tables
	Formulae	• Use formulae to reduce errors and save time	Assessment	• Test your MS Excel capabilities
	Formatting	• Format spreadsheets for effective communication		
MS PPT (15 Hours)	PPT Intro	• Understand the usefulness of MS PPT	Tips and Tricks	• Reduce common mistakes in PPT presentation
	Storyline	• Create an effective story line for a presentation	Assessment	• Test your MS PPT capabilities
	Visual Elements	• Develop effective graphs, charts, and other visuals		

CAREER ADVANCEMENT BOOTCAMP

30 hrs

	Topic	Learning Objectives	Topic	Learning Objectives
Professional Communication (15 hrs.)	Orientation	• Map your CAB journey • Set expectationst and learning goals	Group Discussion	• Show initiative and leadership • Listen intently and respond with meaning • Master useful GD techniques for generating ideas
	Public Speaking	• Increase confidence to speak in public • Generate ideas/information/topics for speaking • Improve tone, volume, and pacing	CV Writing	• Understand various CV formats and uses • Create a unique resume to stand out
	Group Presentation	• Craft a cohesive story as a team • Leverage individual strengths/weaknesses • Manage Q&A from an audience	Interview Preparation	• Develop and deliver your personal story • Listen and respond correctly to questions • Communicate your passion and fit
Team Work (4 hrs.)	Leadership	• Recognize different leadership styles • Work effectively/efficiently in a team • Resolve conflict and problem solve	Workplace Etiquette	• Contribute to a gender-equal workplace • Manage conflict in a constructive way • Cultivate a professional behavior/appearance
Career Preparation (11 hrs.)	Future Planning	• Understand and set SMART goals • Complete a 5-year plan w/associated steps	Reflection	• Identify your achievements during CAB • Articulate next steps
	Industry Project	• Gain knowledge on various industries • Understand career paths and requirements		

Module
Online Training on Animal Welfare and Compassionate Handling at ANDUAT, Ayodhya

Date: 17-21 May'2021Training

Platform: Zoom

INTRODUCTION:

Veterinary Universities are responding to the needs of veterinary profession to equip vet students with the skill and knowledge to work as a veterinary practitioner in the large-animal settings. Veterinary practitioners must competently, confidently and compassionately handle a range of large animals for the proper diagnosis and treatment of ailments. Training in animal handling begins in the first year of the course with highly structured small-group practical classes involving cattle, horses, sheep, dogs, cats, pigs, poultry, and laboratory animals (rats and mice). Brooke hospital for Animals (India) as an equine welfare organization aims to enhance skills and knowledge of vet students about handling of equine prior to extramural placements on farms and in veterinary practices. Handling of equine always present unique challenges that difficult to anticipate. Compassionate handling describes any interaction between humans and animals that avoids or minimises animal suffering and promotes animal wellbeing. Brooke has long championed positive human-animal interactions through compassionate handling techniques because good handling contributes to good welfare by creating positive experiences leading to emotional and physical changes that benefit animals by improving welfare. It also enables the effectiveness of veterinary interventions and husbandry practices. Animal welfare is the core subject of Brooke, about which vet students must have basic knowledge and skill to translate these learning for field implementation to improve status of welfare of animals. The knowledge and skills imparted in vet universities in compassionate handling will be reflected in the practice of future practicing vets and para veterinary professionals. It will provide them an opportunity to set a good example to all people who will observe them during their work in the field (animal owners/users, community members, local service providers, colleagues etc.) Since Vet Students are unable to assemble at one place for workshop as usual due to COVID-19 restrictions. Therefore, Brooke India has planned to use alternative and safe training methods i.e. virtual sessions to strengthen the skills & knowledge of vet students in Universities. Once the COVID-19 restrictions are eased then practical demonstrations will be conducted.

AIM: To develop the understanding on Animal welfare, equine behavior and compassionate handling among students of vet Universities to create positive experiences leading to improved animal welfare

OBJECTIVES:

By the end of the training, participants will be able to:-

1. Describe what is meant by animal welfare, and explain its different components.
2. Recognize a variety of equine behaviours associated with different emotional states, including fear, aggression, and relaxation/happiness.
3. Describe the danger zones of equine animals and how to minimize safety risks during handling.
4. Show awareness of the animal's emotional state during handling by responding appropriately to its behavior to ensure safety and good welfare.

5. Recognize the different welfare issues of working equines
6. Estimate age and BCS (Body Condition Score) of equines

PARTICIPANTS:
Vet Students from Universities
DURATION:
5 Days

SESSION PLAN:

Day 1:

Day/Time	Topics	Training methods	Resources	Facilitator
Day 1 10 AM to 01PM 02 PM to 05 PM	-Animal Welfare & its frameworks -What do you mean by Animal Welfare -Different frameworks for animal welfare (PEN, 5 Freedom, 5 Domains) - Q & A session	Online: Presentation and discussion	PPT, laptop,	Dr Nidhish Bhardwaj Head of Animal Health & Welfare, Brooke India
Day 2 10 AM to 01PM 02 PM to 05 PM	Behaviour/ Ethology - Natural Behaviour of equine - How equines communicate - Species specific behaviours - Q & A session	Online: Presentation and discussion	PPT, laptop, AV Aids	Dr Nidhish Bhardwaj Head of Animal Health & Welfare, Brooke India
Day 3 10 AM to 01PM 02 PM to 05 PM	Welfare Assessment and welfare issuesof working equines -Hobbling -Interference -BCS - Hoof shape -Q & A session	Online: Presentation and discussion	PPT, laptop, AV Aids	Dr Sarita Negi Veterinary Officer Animal Welfare & Training
Day 4 10 AM to 01PM 02 PM to 05 PM	Ageing of working equines -Dentition & Ageing of equines -Q & A session	Online: Presentation and discussion	PPT, laptop, AV Aids	Dr Sarita Negi Veterinary Officer Animal Welfare & Training
Day 5 10 AM to 01PM 02 PM to 05 PM	Compassionate Handling - Guiding Principles to handlingwith compassion - Danger zone of equine & safetytips - Physical methods of restraining - Q & A session	Online: Presentation and discussion	PPT, laptop, AV Aids	Dr Nidhish Bhardwaj Head of Animal Health & Welfare, Brooke India

Training Evaluation: Feedback of students will be collected on an evaluation form before and after the training to evaluate the training.

Value Added Course Syllabus

Flower Arrangement

Department of Family Resource Management and Consumer Science

Period	:	15 Days (30 contact hours)
Credit	:	2 (0+2)
Training Period Per day	:	2 hours

Objectives -

The objective of this **Course Syllabus (Value addition of flowers)** is for students to establish and run their own enterprise at zero budget which will again later on take the form of big income generating activity for the student.

Course Syllabus -

- Basic elements of art and principles in flower arrangement and combination of principles with elements.
- Flowers and foliages suitable for flower arrangement.
- Mechanics/Equipments and tools required. Conditioning cut flower and foliage.
- Arrangement of different types of fresh flowers for decoration for different areas and occasions.
- Introduction to different models of flower arrangement -- Triangular model, Round bowl model Oval bowl model L-shape model, S- shape model, crescent shape model.
- Introduction to different models of containers.
- Preparation of floating flower arrangements for different occasions and its combination with flower rangoli.
- Selection of cloths and waste material for making flowers, Preparation of different types of flowers artificially, its combination with dry arrangements, combination of ornamental leaves with dry arrangement.
- Application of rangoli with flowers and other items. Preparation of bouquets.

References -

1. http://encyclopedia.thefreedictionary.com/Flower+bouquet
2. http://en.wikipedia.org/wiki/Flower_bouquet
3. http://encyclopedia.thefreedictionary.com/Wreath

Charles Griner, 2005, Floriculture- Designing and Merchandising, Delmar Publishers, An International Thomson Publishing Company.

अधिष्ठाता
कृषि विज्ञान महाविद्यालय
एवं प्रौ० शि० शि०
नरेन्द्र देव कृषि एवं प्रौ० शि० शि०
कुमारगंज, अयोध्या

Scanned with Ca

VALUE ADDED COURSE

Physical Education and Yoga Practices 2(0+2) **50 Contact Hrs.**

1. Teaching – Meaning, Scope and importance of Physical Education
2. Teaching – Definition, Type of Tournaments
3. Teaching – Physical Fitness and Health Education
4. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
5. Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
6. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
7. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation
8. Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation
9. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game
10. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
11. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
12. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
13. Teaching of skills of Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
14. Teaching of skills of Badminton – involvement of all the skills in game situation with teaching of rule of the game
15. Teaching of some of Asanas – demonstration, practice, correction and practice
16. Teaching of some more of Asanas – demonstration, practice, correction and practice
17. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
18. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
19. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game
20. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
21. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation
22. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
23. Construction and laying out of the track and field.
24. Teaching of different track events – demonstration practice of the skills and correction.
25. Teaching of different track events – demonstration practice of the skills and correction.
26. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
27. Teaching of different field events – demonstration practice of the skills and correction.
28. Teaching of different field events – demonstration practice of the skills and correction.
29. Teaching of different field events – demonstration practice of the skills and correction.
30. Teaching of different field events – demonstration practice of the skills and correction.

Officer In-charge (Games & Sports)
A.N.D.U.A.&T. Kumarganj
Ayodhya (U.P.)

Department of Food Science and Nutrition
College of Community Science

Value added Course: Basic Nutrition

S.No.	Topic	Hour
1.	Relationship of nutrition to health, growth & human welfare.	1
2.	Definition of terms used in nutrition: Food, Health, Balanced diet, functional food, RDA, photochemical, nutraceuticals , dietary supplements	1
3.	Food groups and its importance	1
4.	Importance of carbohydrates in human nutrition	1
5.	Functions , sources and requirement of proteins	1
6.	Role of lipids and oils in diet	1
7.	Significance of vitamins in maintenance of human health	1
8.	Macro and micro minerals and effects of their deficiencies	1
9.	Importance of Fiber in diet	1
10	Recommended dietary allowances	1
11.	Basics of diet planning	1
12.	Diet planning for pregnant women	1
13.	Diet planning for lactating women	1
14.	Diet planning for adults	1
15.	Nutritional needs of infants	1
16.	Nutritional needs of geriatrics	1
17.	Diet during fever	1
18.	Dietary tips for diabetics	1
19.	Dietary recommendations for hypertension	1
20.	Measurement and management of obesity	1
21.	Assessment of nutritional status through anthropometry	2
22.	Management of Nutrition Garden	2
23.	Planning and preparation of diets for normal condition	2
24.	Planning and preparation of diets for students	2
25.	Preparation of nutrition information material	2
	Total	30 hours

Course Outcome: This course will improve the knowledge of students regarding food groups, balanced die,t during different stages of life cycle and dietary guidelines to the different diseases.

Sadhna Singh
9.6.2022
(Sadhna Singh)

Scanned with Ca

Fish cum Duck Production and Management

Objective

To understand concept of integrated fish farming system and its management.

Theory

Lecture No.	Lecture content	Hrs
1.	Present scenario and problems: Trends in global and Indian aquaculture; different farming systems; Semi and intensive systems.	1
2.	Different type of integration systems and its concept. Introduction of fish cum duck farming system. site selection, basic requirement for duck cum fish farming system.	**1**
3.	Major species cultured, production trends and prospect, Preparation and management-control of aquatic weeds and algal blooms, predatory and weed fishes.	**1**
4.	Design and construction of pond and duck house: on dike and off dike.	**1**
5.	Use of biofertilizers and water quality management.	**1**
6.	Seed selection, transportation and acclimatization of seed.	**1**
7.	Stocking rate and supplementary feeding	**1**
8.	Post stocking pond management practices: manuring, liming, feeding, preventive measures and disease control.	**1**
9.	Physico-chemical characteristics of water and its management.	**1**
10.	Estimation of DO, pH, alkalinity, hardness, ammonia etc.	**1**
11.	Stocking of duck, rearing and management.	**1**
12.	Disease and preventive measurement for disease control.	**1**
13.	Introduction to fish food organism and its importance in fish cum duck fish farming.	**1**
14.	Estimation of primary productivity and its management.	**1**
15.	Artificial feed, its ingredients and preparation of artificial feed.	**1**
16.	Harvesting and post harvesting management and Economic viability	**1**
17.	**Practicals** Identification of different culturable fish species. Identification of different variety of duck, identification of different type of aquatic weed, insects. Estimation of DO, pH, Alkalinity, hardness, CO_2 and NH_3, estimation of primary productivity. Visit of demonstration unit.	**14**
	Total Hrs	**30**

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College of Fisheries